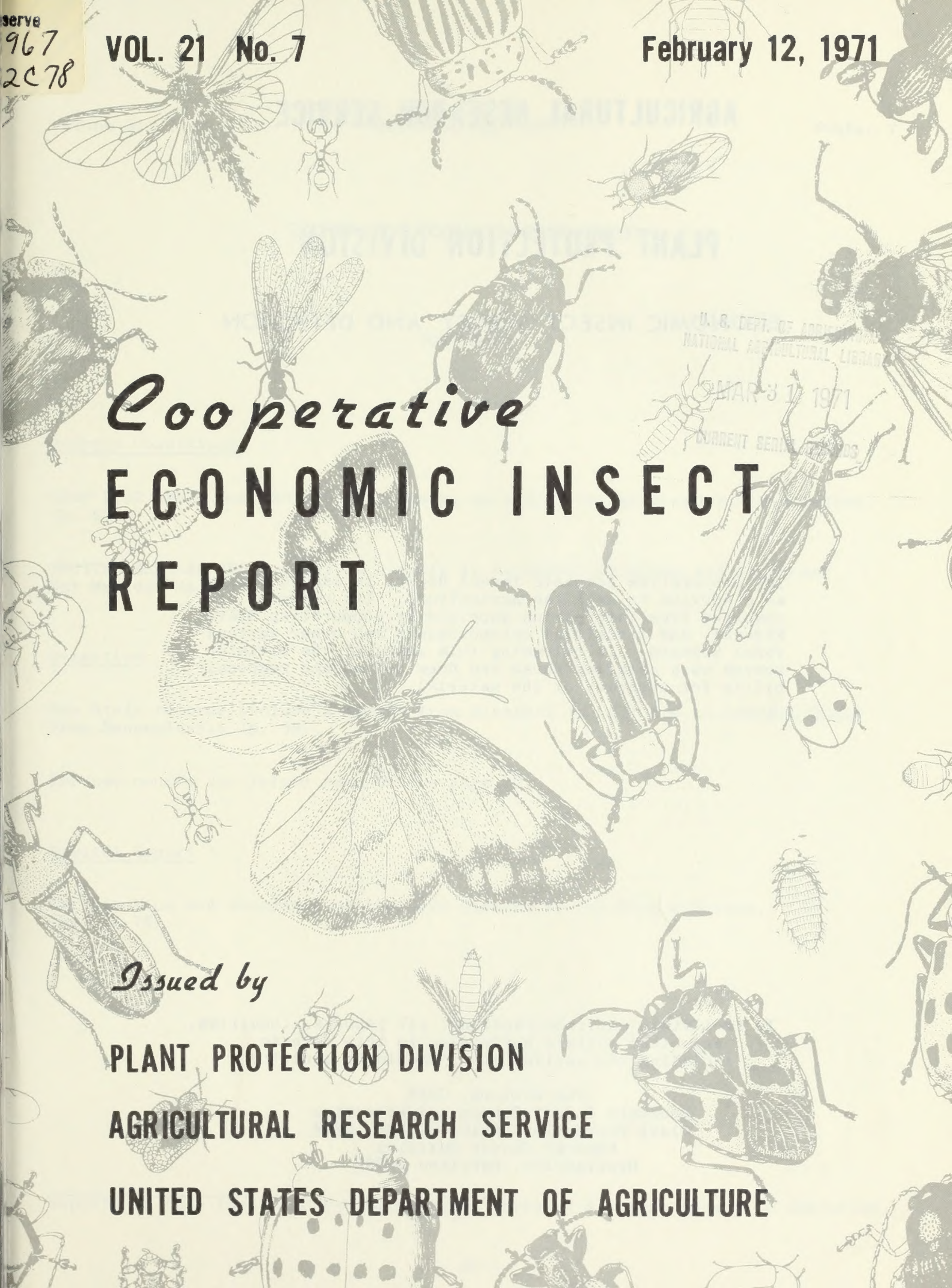
Historic, archived document

Do not assume content reflects current
scientific knowledge, policies, or practices.

serve
967
2C78

VOL. 21 No. 7 February 12, 1971



U.S. DEPT. OF AGRICULTURE
NATIONAL AGRICULTURAL LIBRARY
MAR 31 1971
CURRENT SERIAL RECORDS

Cooperative ECONOMIC INSECT REPORT

Issued by

PLANT PROTECTION DIVISION
AGRICULTURAL RESEARCH SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

PLANT PROTECTION DIVISION

ECONOMIC INSECT SURVEY AND DETECTION

The Cooperative Economic Insect Report is issued weekly as a service to American Agriculture. Its contents are compiled from information supplied by cooperating State, Federal, and industrial entomologists and other agricultural workers. In releasing this material the Division serves as a clearing house and does not assume responsibility for accuracy of the material.

To facilitate mailroom handling, all reports, inquiries,
and other matters pertaining to this release,
including the mailing list, should be sent to:

The Editors, CEIR
Economic Insect Survey and Detection
Plant Protection Division, ARS, USDA
Federal Center Building
Hyattsville, Maryland 20782

Volume 21 February 12, 1971 Number 7

COOPERATIVE ECONOMIC INSECT REPORT

HIGHLIGHTS

Current Conditions

CORN LEAF APHID and GREENBUG increasing on barley in south-central New Mexico. (p. 67).

SPOTTED ALFALFA APHID heavy on alfalfa in southwest Oklahoma and southeast New Mexico. (p. 67).

Detection

New State records include a WEEVIL from Missouri (p. 67) and an ARMORED SCALE from Pennsylvania (p. 68).

For new county and island records see page 70.

Special Report

Distribution and Abundance of the Corn Earworm in the United States. (pp. 71-76).

Reports in this issue are for week ending February 5 unless otherwise indicated.

CONTENTS

Special Insects of Regional Significance....67

Insects Affecting

Corn, Sorghum, Sugarcane....67
Small Grains....67
Forage Legumes....67
Tobacco....68
Deciduous Fruits and Nuts....68
Citrus....68
Ornamentals....68
Forest and Shade Trees....68
Man and Animals....68
Households and Structures....69
Stored Products....69

Beneficial Insects....69
Federal and State Plant Protection Programs....69
Light Trap Collections....70
Hawaii Insect Report....70
Detection....70
Distribution and Abundance of the Corn Earworm in the United States....71

WEATHER OF THE WEEK ENDING FEBRUARY 8

PRECIPITATION: Early in the week cold westerly winds set off snow flurries on the lee side of the Great Lakes and in hilly areas of New York and Pennsylvania. Light rain dotted the Pacific Northwest with snow inland across the Cascades and eastward to the Great Lakes. Rain mixed with snow fell over parts of the Great Basin. A low in the western part of the Gulf of Mexico spread rain over eastern Texas Tuesday. A large and powerful storm began shaping up in the central Rocky Mountains Wednesday. The storm center moved to northeastern New Mexico, crossed the Texas Panhandle and Oklahoma to northwestern Arkansas, then turned northward, crossed Missouri and Illinois and by late Thursday night was centered over southern Wisconsin. By the weekend the storm had moved to the Hudson Bay. It produced widespread precipitation from Canada to the Gulf of Mexico, and eastward to the Atlantic Ocean. Snow fell in the northern and central Rocky Mountains and northern Great Plains to the upper Mississippi River Valley. Freezing rain and freezing drizzle iced roads from eastern Nebraska and central Kansas to New Jersey and southward to northern Georgia. Scattered thundershowers occurred from Oklahoma and northeastern Texas to the Ohio River Valley, and southward to the Gulf of Mexico. In most areas snow or rain was accompanied by fog. A few tornadoes hit Mississippi and Alabama late Thursday evening. A tornado at Grenada, Mississippi, killed 7 persons. Few localities in the eastern half of the Nation escaped the damp and dismal weather produced by the massive storm. To add to the misery produced by the storm winds in the Ohio River Valley gusted to over 70 m.p.h. at some localities Friday forenoon. A new storm moved out of the southern Rockies over the weekend. It produced snow from Colorado and New Mexico to New England. Showers and thunderstorms occurred from the snow belt southward to the Gulf of Mexico. Some of the thunderstorms produced hail. Hail as large as baseballs fell at Deland, Florida, Sunday afternoon. Monday morning much of the northeast was buried in several inches of snow. Heavy rains south of the snow belt threatened to cause flash floods along some smaller streams from New Jersey to South Carolina. Tornadoes struck Georgia and Florida Monday, and funnel clouds were seen in South Carolina.

Weather of the week continued on page 77.

SPECIAL INSECTS OF REGIONAL SIGNIFICANCE

CORN LEAF APHID (Rhopalosiphum maidis) - NEW MEXICO - Populations increasing on barley in Luna and Dona Ana Counties. (Riddle).

GREENBUG (Schizaphis graminum) - NEW MEXICO - Populations increasing on barley in Luna and Dona Ana Counties. (Riddle). TEXAS - Light in most Panhandle counties. Light on small grain in Burleson County. (Daniels, Green). OKLAHOMA - Ranged 20-100 per linear foot on small grains in Custer, Roger Mills, Beckham, and Washita Counties. (Okla. Coop. Sur.). ARKANSAS - Survey remains negative in northwest area. (Boyer).

SPOTTED ALFALFA APHID (Therioaphis maculata) - ARIZONA - Averaged 210 per 100 sweeps of alfalfa in Yuma County field. (Ariz. Coop. Sur.). NEW MEXICO - Generally moderate to heavy on alfalfa in Carlsbad and Artesia areas, Eddy County. Ranged 50-100 per square foot in most fields. Effects evident on young alfalfa. (Mathews). OKLAHOMA - Very heavy in alfalfa in Kiowa, Tillman, and Washita Counties. (Okla. Coop. Sur.).

CORN, SORGHUM, SUGARCANE

NORTHERN CORN ROOTWORM (Diabrotica longicornis) - MARYLAND - Specimens collected at Valley Lee, St. Marys County, by J. Lashomb September 3 and at Shad Landing, Worcester County, by R.L. Smiley October 3, 1970. Determined by J. Hellman. These are new county records. (U. Md., Ent. Dept.).

SMALL GRAINS

ENGLISH GRAIN APHID (Macrosiphum avenae) - ARKANSAS - Ranged 15-20 per 100 sweeps of wheat in northwest area. (Boyer).

WINTER GRAIN MITE (Penthaleus major) - OKLAHOMA - Averaged 50 per linear foot of small grain in Washita County. (Okla. Coop. Sur.).

FORAGE LEGUMES

ALFALFA WEEVIL (Hypera postica) - KENTUCKY - Eggs 210 per square foot of alfalfa in Fayette County. (Barnett). TEXAS - Larvae averaged 3 per alfalfa plant in one field in Burleson County; heavy damage noted. Heavy in Wharton and Brazoria Counties. Controls applied in these areas. (Latham, Thomas). Brazoria is a new county record. (PPD).

CLOVER LEAF WEEVIL (Hypera punctata) - NEW MEXICO - Adults and larvae averaged less than 1 per square foot in fields found heavily infested during 1970 in Hagerman and Dexter area, Chaves County. (Mathews).

EGYPTIAN ALFALFA WEEVIL (Hypera brunneipennis) - ARIZONA - Averaged 60 larvae and 30 adults per 100 sweeps of alfalfa in Yuma County field. (Ariz. Coop. Sur.).

A WEEVIL (Sitona scissifrons) - MISSOURI - Specimen swept from alfalfa at Rock Port, Atchison County, May 9, 1968, by R.E. Munson. Determined by M. Tanner. This is a new State record. (Munson).

PEA APHID (Acyrthosiphon pisum) - ARIZONA - Averaged 210 per 100 sweeps of alfalfa in one Yuma County field. (Ariz. Coop. Sur.). NEW MEXICO - Light to moderately heavy in alfalfa in Luna and Dona Ana Counties. (Riddle). Ranged 100-200+ per square foot in fields near Carlsbad and Artesia, Eddy County. (Mathews). ARKANSAS - Survey remains negative in northwest areas. (Boyer).

GREEN CLOVERWORM (Plathypena scabra) - TEXAS - Moderate on clover in Madison County. (Coster).

TOBACCO

TOBACCO BUDWORM (*Heliothis virescens*) - NORTH CAROLINA - Loss by this species and *H. zea* (corn earworm) on tobacco during 1970 totalled $750,000. Controls applied to about 375,000 acres. (Hunt).

DECIDUOUS FRUITS AND NUTS

SAN JOSE SCALE (*Quadraspidiotus perniciosus*) - CALIFORNIA - Counts 20 per stem on almonds at Wheatland, Placer County. Increased past 2 years. (Cal. Coop. Rpt.). ALABAMA - Ten peach trees in small orchard heavily infested, several trees dead, in Coffee County. (Speed).

WALNUT SCALE (*Quadraspidiotus juglansregiae*) - CALIFORNIA - Ranged 30-40 per limb on walnut trees locally at Fresno, Fresno County. (Cal. Coop. Rpt.).

EUROPEAN FRUIT LECANIUM (*Lecanium corni*) - CALIFORNIA - Scattered counts of 5 per twig in 20-acre almond orchard at Roseville, Placer County, and 2 per twig at Orland, Glenn County. (Cal. Coop. Rpt.).

CITRUS

A LEAF ROLLER MOTH (*Platynota stultana*) - CALIFORNIA - Larvae 1 per orange fruit in nursery at Modesto, Stanislaus County, and in yard planting at La Mesa, San Diego County. (Cal. Coop. Rpt.).

ORNAMENTALS

AN ARMORED SCALE (*Lepidosaphes pini*) - PENNSYLVANIA - Specimens collected from mugho pine at Philadelphia, Philadelphia County, by S. Green October 8, 1970. Determined by M. Kosztarab. (Gesell). This is a new State record. Previously reported only from Maryland. (PPD).

FOREST AND SHADE TREES

A CYNIPID WASP (*Callirhytis perdens*) - CALIFORNIA - Heavy on oak trees in 5-acre stand at Somerset, El Dorado County. Many tips damaged. (Cal. Coop. Rpt.).

PINE NEEDLE SCALE (*Phenacaspis pinifoliae*) - CALIFORNIA - Ranged 2-10 per needle on *Pinus thunbergii* (Japanese black pine) nursery stock at Fallbrook, San Diego County. (Cal. Coop. Rpt.).

MAN AND ANIMALS

SCREWWORM (*Cochliomyia hominivorax*) - No cases reported in U.S. January 31 to February 6. Total of 89 laboratory-confirmed cases reported in portion of Barrier Zone in Republic of Mexico as follows: Sonora 56, Chihuahua 5, Nuevo Leon 6, Tamaulipas 22. Total of 3 cases reported in Mexico south of Barrier Zone. Barrier Zone is area where eradication operation underway to prevent establishment of self-sustaining population in U.S. Sterile screwworm flies released: Texas 2,758,000; Mexico 101,280,000. (Anim. Health Div.).

CATTLE GRUBS (*Hypoderma* spp.) - CALIFORNIA - Larvae of *H. lineatum* (common cattle grub) and *H. bovis* (northern cattle grub) emerged from cattle backs in October and in December. Normally pupation and emergence would be February; however, warm weather in Santa Barbara County activated some emergence. Northern counties will probably have near normal emergence. *H. bovis* does not occur naturally in State. (Cal. Coop. Rpt.). OKLAHOMA - *H. lineatum* ranged 5-30 per head on yearling cattle in Lincoln County and 0-12 (averaged 4) per head in Payne County. Moderate in Mayes County and light in Choctaw County. (Okla. Coop. Sur.). MISSOURI - Larvae of *H. lineatum* in 98 of 217 cattle at sales in central area. Checked 71 cows, 19 infested (averaged 1.7 larvae per animal). Checked 146 calves, 79 infested (averaged 6.7 larvae per animal). (Ronald, Wingo). KENTUCKY - *Hypoderma* spp. ranged 0-20 (averaged 7) per animal on backs of Holstein cattle of various ages in Fayette County. (Barnett).

CATTLE LICE - ALABAMA - Remain light on cattle statewide. Reports indicate problems on some beef cattle herds in Wilcox and Bibb Counties. (Farquhar, Odom). OKLAHOMA - Mainly *Haematopinus eurysternus* (shortnosed cattle louse), averaged 4 per 10 hair parts on cattle in Payne County. Moderate in Bryan, Lincoln, and Mayes Counties. (Okla. Coop. Sur.). CALIFORNIA - *Linognathus vituli* (longnosed cattle louse) building up in herds of untreated cattle. Light in treated herds. (Loomis, Jan. 29).

HOG LOUSE (*Haematopinus suis*) - OKLAHOMA - Heavy on hogs in Bryan County. (Okla. Coop. Sur.).

WINTER TICK (*Dermacentor albipictus*) - OKLAHOMA - Heavy on cattle in Osage County. (Okla. Coop. Sur.).

HOUSEHOLDS AND STRUCTURES

SOUTHERN LYCTUS BEETLE (*Lyctus planicollis*) - CALIFORNIA - Infested oak flooring in supply house at Stockton, San Joaquin County. (Cal. Coop. Rpt.).

SOUTHERN FIRE ANT (*Solenopsis xyloni*) - CALIFORNIA - Adults entering residence and biting inhabitants at Buena Park, Orange County. (Cal. Coop. Rpt.).

WESTERN SUBTERRANEAN TERMITE (*Reticulitermes hesperus*) - CALIFORNIA - Adults, 50 per sweep, emerged from house vent at Visalia, Tulare County. Warm weather following rain activated emergence about month earlier than usual. (Cal. Coop. Rpt.).

STORED PRODUCTS

RICE WEEVIL (*Sitophilus oryzae*) - TEXAS - Moderate to heavy in stored oats in Ward County. (Neeb).

SAWTOOTHED GRAIN BEETLE (*Oryzaephilus surinamensis*) - KENTUCKY - Adults averaged 18 per pound of seed oats on February 2 at one location in Fayette County. (Barnett).

DERMESTID BEETLES - CALIFORNIA - Trogotraps in mixed feed collected total of 85 larvae in supply store at Rosedale, Kern County, and 140 *Trogoderma variabile* larvae in seed house at Bakersfield. (Cal. Coop. Rpt.).

BENEFICIAL INSECTS

A LADY BEETLE (*Coleomegilla maculata*) - MISSISSIPPI - Overwintering adults averaged 25 per tree in trash beneath cottonwoods in Washington County. (Sartor).

FEDERAL AND STATE PLANT PROTECTION PROGRAMS

GYPSY MOTH (*Porthetria dispar*) - CONNECTICUT - Egg mass densities ranged 320-1,953 per acre at Old Saybrook, Middlesex County; 4,075 acres involved. Defoliation expected to be 70 percent of woodland canopy. (Anderson, Jan. 29).

PINK BOLLWORM (*Pectinophora gossypiella*) - NEW MEXICO - No larvae found in old bolls on standing stalks in Lewis Flats area, Luna County. (Riddle).

HAWAII INSECT REPORT

Turf, Pasture: Adults of a SKIPPER (*Hylephila phylaeus*) light in grassy areas and on flowers of golden dewdrop (*Duranta repens*) at Hickam Air Force Base, Oahu. Light numbers at large at Salt Lake where first specimens collected September 1970. (Olson, Kajiwara, Kawamura).

General Vegetables - Larvae of SWEETPOTATO LEAFMINER (*Bedellia orchilella*) severe in 0.5 acre of sweetpotato at Waiahole, Oahu; as many as 15 (averaged 10) per leaf. (Kashiwai). Larvae of TOMATO PINWORM (*Keiferia lycopersicella*) heavy in 0.25 acre of tomato at Omapio, Maui; about 80 percent of leaves affected. This is a new island record. Previously unreported from Maui, now occurs on every major island except Lanai. (Hori). Percent parasitism of BEAN FLY (*Melanagromyza phaseoli*) by *Opius* spp. (braconids) in field collected snap bean material on Kauai was 100 at Koloa and zero at Lihue; parasitism in cowpea material collected at Mana, Waimea, and Kapaa ranged 0-87 (average 31) percent. Sampling from severely infested snap bean planting at Waimanalo, Oahu, yielded 15 percent parasitism; sampling from 0.5-acre soybean planting in same area showed 50 percent parasitism. (Sugawa, Kawamura).

General Pests - A PLATASPID BUG (*Coptosoma xanthogramma*) heavy on *Mucuna* sp. at Kapoho and on snap beans at Papaikou, Hawaii. Generally trace on *Erythrina* sp. at Ewa, Oahu; light on some terminals, as many as 2 nymphs and/or adults per terminal. (Yoshioka, Kawamura).

Miscellaneous Insects - Nymphs and adults of SOUTHERN GREEN STINK BUG (*Nezara viridula*) moderate in 3 acres of wild bittermelon (*Momordica charantia*) and maunaloa (*Canavalia cathartica*) at Ahukini, Kauai; light on spiny amaranth (*Amaranthus spinosus*) and popolo (*Solanum nigrum*) at Ewa, Oahu; one adult and/or nymph per sweep. Parasites nil at both areas. (Sugawa, Kawamura). Larvae of KOA HAOLE LOOPER (*Anacamptodes fragilaria*) caused severe defoliation of koa haole, klu, and kiawe at Waimea, Kekaha, and Mana, Kauai; 90-100 percent defoliation in about 1,500 acres in these areas. Sweeping of wayside koa haole at Waipahu showed 5:1 ratio of this pest and *Semiothisa* sp., probably *santaremaria* (a geometrid). (Sugawa, Kawamura).

DETECTION

New State Records - AN ARMORED SCALE (*Lepidosaphes pini*) PENNSYLVANIA - Philadelphia County (p. 68). A WEEVIL (*Sitona scissifrons*) MISSOURI - Atchison County (p. 67).

New County and Island Records - ALFALFA WEEVIL (*Hypera postica*) TEXAS - Brazoria (p. 67). NORTHERN CORN ROOTWORM (*Diabrotica longicornis*) MARYLAND - St. Marys, Worcester (p. 67). TOMATO PINWORM (*Keiferia lycopersicella*) HAWAII - Maui (p. 70).

LIGHT TRAP COLLECTIONS

FLORIDA - Gainesville, 1/29-2/4, BL - Armyworm (*Pseudaletia unipuncta*) 1, black cutworm (*Agrotis ipsilon*) 4, granulate cutworm (*Feltia subterranea*) 10.

DISTRIBUTION AND ABUNDANCE OF THE CORN EARWORM IN THE UNITED STATES

J. Wendell Snow and W. W. Copeland [1]

The corn earworm (Heliothis zea (Boddie)) is probably the most destructive pest of American agriculture because of its wide geographic distribution and number of economic host crops. Considerable attention has been given to the areawide suppression of this species. However, the scope of such a concept is limited until more basic biological information becomes available. More data are needed on activity patterns of the insect in its varying ecological niches throughout the country. Equally great is the need to determine the overwintering area of the species. Data pertaining to these needs are scattered throughout the "Cooperative Economic Insect Report" (CEIR) published over the last 19 years. We have tried to summarize these data from 1951 through 1969 as well as literature reports of overwintering areas.

Chronological activity is plotted geographically in Figure 1. The numerical value within State boundaries indicates the number of reports from each State within the period 1951 through 1969. Weather data for the United States were obtained from the Department of Commerce (1968), and the mean dates of the last spring freeze over the past 50 years were plotted. Shaded areas in Figure 1 show geographically the varying dates of the last spring freeze. It appears that the mean date of the last spring freeze and Heliothis spp. activity relate directly. Soil temperatures would be of equal importance but, unfortunately, adequate records are not available.

The corn earworm progresses through continuous generations in the southern portions of Florida and Texas. Both areas, as well as Louisiana, have small portions that average only 2 days per year with temperatures below 32°F. Based on larval reports for January and February, the normal northern limit of continuous activity in Florida probably extends as far north as Gainesville. The Brownsville and Weslaco area of Texas is definitely a continuous generation area based on light trap captures in all months of the year (CEIR). The northern limit probably extends a few miles north of these locations. Light trap and larval report data fail to show evidence of continuous generations in any of the other Southern States including Louisiana. Table 1 shows monthly larval reports of these States and those of California, Arizona, and New Mexico. More reports are noted for each of the States than indicated in Figure 1 because single reports often covered several months and locations. These are considered separately to show monthly activity. Based on data in this table, argument could be raised that these Western States serve as continuous generation areas in some years.

The solid dark portion of Figure 1 shows the area of "some years no freeze." This area extends from South Carolina to Oregon, and could serve as a continuous generation area during the no-freeze years. Activity of moths and larvae in this dark shaded area begins in February to March. In the dotted light area (last spring freeze before March 30) larval and light trap activity begin in early March to April. This area extends all the way from Virginia to Washington. Earlier activity in the eastern portions of South Carolina, North Carolina, and Virginia, and in southern California and Arizona are consistent each year (CEIR).

Activity begins in the light shaded area (last spring freeze March 30-April 30) in April to June and extends from Maine to Washington. Heliothis spp. activity recorded in CEIR reports for these States is generally earlier than other literature reports and places some doubt on earlier conclusions that infestations in the North are the results of migrations from the South. The unshaded portion (last spring freeze April 30-May 30) shows activity beginning in late June to August. Activity begins in the dark area with white dots (last spring freeze after May 30) in August and represents the coldest areas of the United States. This as well as the unshaded area is a non-overwintering area, and the activity in any specific portion depends greatly on the distance from an overwintering area.

---

[1] Entomology Research Division, Agricultural Research Service

Northern Overwintering Limit.--The "Cooperative Economic Insect Report" and other available literature indicate that the northern overwintering limit of Heliothis spp. in the United States corresponds to the area of the last spring freeze before April 30 (light shaded area in Figure 1). Metcalf and Flint (1951) concluded that it was very doubtful if pupae could survive above 40° north latitude. Blanchard et al. (1964) stated that the boundary was 38° latitude in the central United States. Hardwick (1965) says "The region in which winter pupal survival is possible but hazardous seems to correspond roughly with the Upper Austral Zone."

Locations of successful overwintering and total winterkill are shown in Figure 1. On the eastern seaboard, Barber (1939) reported that the corn earworm could survive the winter in sandy soil in West Dennis, Massachusetts; Milford, Connecticut; and Mount Carmel, Connecticut, but could not overwinter in the northern part of Connecticut. He cited emergence as beginning in June. Bourne et al. (CEIR 4(1):12, 1954) stated in a summary of insect conditions for Massachusetts in 1953 that "The early appearance of well-developed larvae would indicate the pest successfully overwintered at least in the Connecticut Valley and southeastern Massachusetts." Overwintering is well-documented throughout Delaware, New Jersey, and Maryland (Ditman and Cory 1931, 1933; Ditman 1943; Burbutis in CEIR 19(21):357, 1969). Pepper (1941) stated that "Records show that large numbers of pupae are able to survive the winter in the sandy soils of southern New Jersey, whereas a much smaller number survive in northern New Jersey." Winter survival in New York occurs only on Long Island and in the Hudson River Valley (Carruth 1937, 1949). Adults are present in June.

In Pennsylvania, Felt (1925) stated that "The corn earworm probably does not overwinter in any numbers north of southern Pennsylvania." Blanchard (1942) showed corn earworm survival in Carlisle, Pennsylvania, as well as Arlington, Virginia; Moorestown, New Jersey; Lexington, Kentucky; West Dennis, Massachusetts; Marietta, Ohio; Charleston and Valley Park, Missouri; Ewing and Urbana, Illinois; Fayetteville, Arkansas; Lafayette, Indiana; Stillwater, Oklahoma; Wichita and Manhattan, Kansas; and Prosser and Walla Walla, Washington. These locations are shown in Figure 1. Lugger (1895) stated that Minnesota probably has a complete kill of Heliothis spp. pupae each year. In Wisconsin, moths were reported as emerging from the Arlington area in which the last freeze occurs before April 30 (CEIR 13(29):815, 1963). Another report (CEIR 15(27):707, 1965) from Wisconsin cited overwintering pupae responsible for adults noted at the end of June.

In Ohio, Williams (1923) and Houser (1935) reported overwintering as far north as Chillicothe but declared that it probably did not occur north of this area. Blanchard (1942) found a complete winterkill in the Toledo area during 1935-1939. Walter (1938) reported a single moth emerging at Lafayette, Indiana, while none emerged at Auburn or Orleans, Indiana. Blanchard (1942) also reported hibernation at Lafayette. Everly et al. (CEIR 13(4):48, 1963) stated that overwintering in southern Indiana has been found occasionally but that infestation in late summer originates from moths flying in from the South. Brown et al. (1943) stated that few pupae survived the severe winters of northern Missouri. Based on work by Phillips and King (1923), Phillips and Barber (1929), Barber and Dicke (1939), and Blanchard and Douglas (1953), overwintering is well-established throughout Virginia. Emergence of moths begins in the latter part of May. In Kentucky, Emmert and Price (1942) report a small percentage of moths surviving the winter beyond Lexington. Moth activity begins in May (Garman and Jewett 1914). Barber (1941) established hibernation for the species around Savannah, Georgia, with moth emergence beginning in March (Barber and Dicke, 1939). In Kansas, Headlee (1910) reports the third generation as the overwintering brood. The "Cooperative Economic Insect Report" (17(8):122, 1967) states that the species does not overwinter in Montana.

A report from Utah (CEIR 2(5):60, 1952) indicates that "Surviving pupae in the soil in northern Utah averaged 0.004 per square foot in April 1952, as compared to 0.009 in 1950 and 0.007 in 1951." This is the only report of overwintering beyond the area with the last spring freeze before April 30. In Colorado, evidence (CEIR 6(20):424, 1956) is cited for successful overwintering in Otero County, within the zone of the last freeze before April 30.

In Texas, Parencia (1964) reports overwintering in Waco, and Fletcher (1937) at College Station. Overwintering is cited in Oklahoma (Moorehouse 1908) and in Arkansas (Isely 1935; Boyer et al. in CEIR 13(7):109, 1963). Activity begins in these States during April. In Washington, Eichmann (1940) reports winter survival at Prosser and Walla Walla but not at Spokane. Activity normally begins in June in Washington (CEIR for 1963, 1965, 1969).

Summary.--The corn earworm shows an amazing ability to survive in most areas of the United States. Time of first activity appears closely related to the date of the last spring freeze. Proof can be offered for continuous generations only in southern Florida and southern Texas. Continuous generations are limited by low temperatures in any particular year. First adult activity apparently begins earlier in most areas of the country than generally reported in the literature. The apparent northern limit for overwintering coincides with the last spring freeze before April 30. A possibility exists that damage to corn and other crops in these States is the result of local overwintering populations rather than migrations from the South as commonly reported.

LITERATURE CITED

U.S. DEPT. COMMERCE. 1968. Climatic atlas of the United States. U.S. Government Printing Office, Washington, D.C. 80 pp.

BARBER, G. W., and DICKE, F. F. 1937. The effectiveness of cultivation as a control for the corn earworm. USDA Tech. Bul. 561, 16 pp.

BARBER, G. W. 1939. Hibernation of the corn earworm in southern Connecticut. Conn. Agr. Expt. Sta. Bul. 419, 27 pp.

BARBER, G. W., and DICKE, F. F. 1939. Effect of temperature and moisture on overwintering pupae of the corn earworm in the Northeastern States. J. Agr. Res. 59:711-723.

BARBER, G. W. 1941. Hibernation of the corn earworm in southeastern Georgia. USDA Tech. Bul. 791, 17 pp.

BLANCHARD, R. A. 1942. Hibernation of the corn earworm in the central and northeastern parts of the United States. USDA Tech. Bul. 838, 14 pp.

BLANCHARD, R. A., and DOUGLAS, W. A. 1953. The corn earworm as an enemy of field corn in the Eastern States. USDA Farmer's Bul. 1651, 15 pp.

BLANCHARD, R. A., DOUGLAS, W. A., and HENDERSON, C. A. 1964. Temperature and rainfall as they affect corn earworm damage to dent corn. USDA, ARS 33-97, 8 pp.

BROWN, H. E., VINSON, C. G., and HASEMAN, L. 1943. Protect roasting ears from worms. Mo. Agr. Expt. Sta. Cir. 270, 8 pp.

CARRUTH, L. A. 1937. Seek effective control of corn earworm. Farm Research. 3(4):6, 14.

CARRUTH, L. A. 1949. The corn earworm and its control. N.Y. Agr. Expt. Sta. Cir. 190, 14 pp.

DITMAN, L. P., and CORY, E. N. 1931. The corn earworm biology and control. Md. Agr. Expt. Sta. Bul. 328:480-482.

DITMAN, L. P., and CORY, E. N. 1933. Corn earworm studies. Md. Agr. Expt. Sta. Bul. 348:525-543.

DITMAN, L. P. 1943. The corn earworm infestation of 1942. J. Econ. Ent. 36:629-630.

EICHMANN, R. D. 1940. Corn earworm hibernates in Washington State. J. Econ. Ent. 33:951-952.

EMMERT, E. M., and PRICE, W. A. 1942. Control of the corn earworm by clipping. Ky. Agr. Expt. Sta. Bul. 436, 10 pp.

FELT, E. P. 1925. The dissemination of insects by air currents. J. Econ. Ent. 18:152-158.

FLETCHER, R. K. 1937. Cotton bollworm: Hibernation and spring emergences. Tex. Agr. Expt. Sta. Ann. Rpt. 50:63-64.

GARMAN, H., and JEWETT, H. H. 1914. The life history and habits of the corn earworm (*Chloridea obsoleta*). Ky. Agr. Expt. Sta. Bul. 187:511-591.

HARDWICK, D. F. 1965. The corn earworm complex. Ent. Soc. Can. Mem. No. 40, 247 pp.

HEADLEE, T. J. 1910. Notes on the corn earworm. J. Econ. Ent. 3:149-157.

HOUSER, J. S. 1935. The Ohio Veg. Growers Assoc. Ann. Meeting 20:27-34.

ISELY, DWIGHT. 1935. Relation of hosts to abundance of cotton bollworm. Ark. Agr. Expt. Sta. Bul. 320, 30 pp.

LUGGER, OTTO. 1895. Insects injurious in 1895. Minn. Agr. Expt. Sta. Bul. 43:198.

METCALF, E. L., and FLINT W. P. 1951. Destructive and useful insects. Edition 3. McGraw-Hill Book Co., New York, N.Y. 1071 pp.

MOORHOUSE, L. A., and NICHOLSON, J. F. 1908. Cotton culture. Okla. Agr. Expt. Sta. Bul. 77:54-56.

PARENCIA, C. R. 1964. Winter survival of the bollworm in central Texas. J. Econ. Ent. 57:757-758.

PEPPER, B. B. 1941. The corn earworm and its control on sweet corn. N.J. Agr. Expt. Sta. Cir. 413, 13 pp.

PHILLIPS, W. J., and KING, K. M. 1923. The corn earworm, its ravages on field corn and suggestions for control. USDA Farmer's Bul. 1310, 17 pp.

PHILLIPS, W. J., and BARBER, G. W. 1929. A study of hibernation of the corn earworm in Virginia. Va. Agr. Expt. Sta. Bul. 40, 24 pp.

WALTER, E. V. 1938. Fifty-first annual report of Purdue University Agriculture Experiment Station for year ending June 30, 1938. 57 pp.

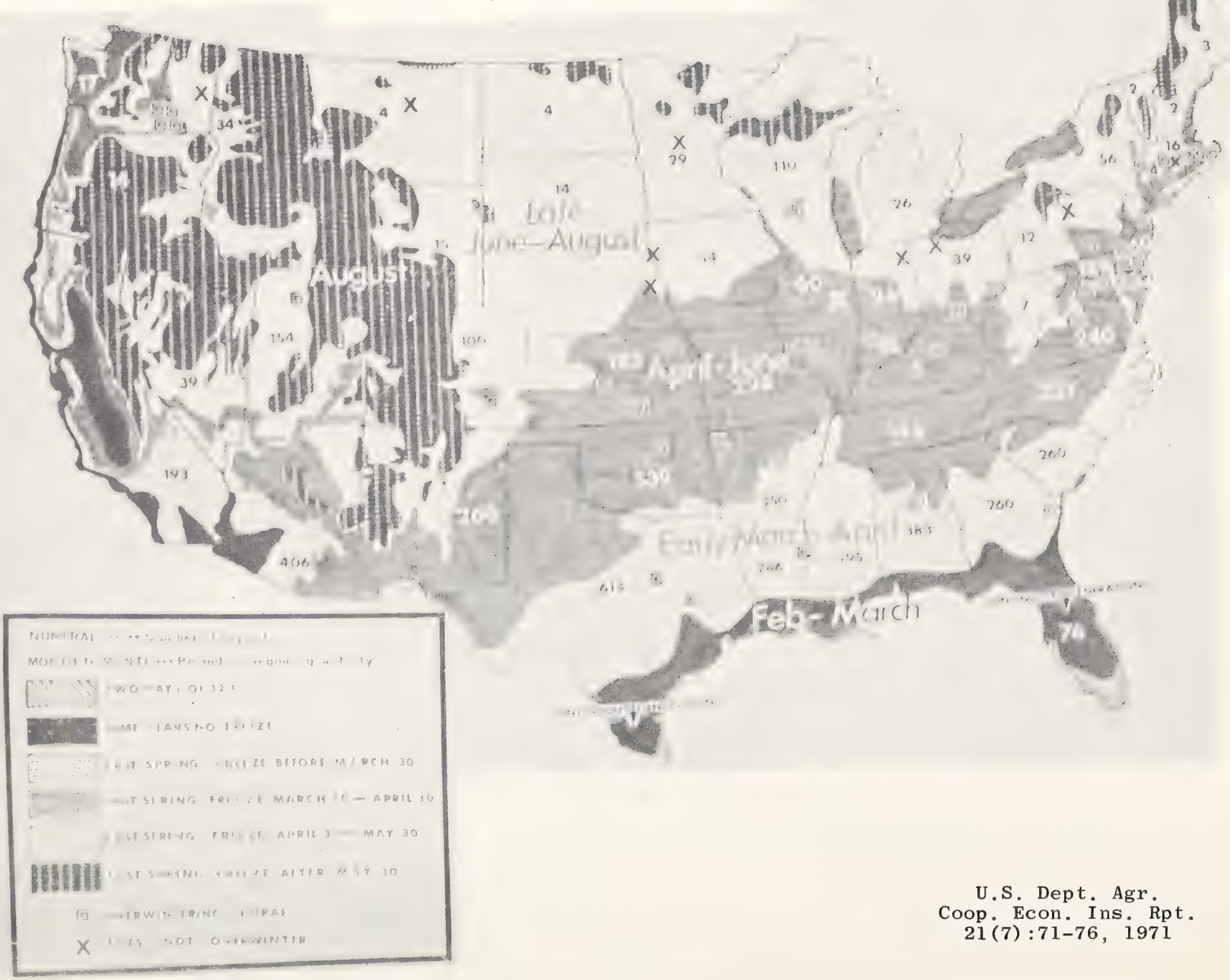
WILLIAMS, W. P. 1923. Pupal hibernation; chemical control. Ohio Agr. Expt. Sta. Ann. Rpt. 42:39-40.

Table 1. Monthly corn earworm larval reports from several Southern and Western States.

Data from Cooperative Economic Insect Report, 1951-1969.

Month	California	Arizona	New Mexico	S.E. Texas	Louisiana	Mississippi	Alabama	Georgia	Florida
January	1	0	1	0	0	0	0	0	2
February	2	6	0	4	0	0	0	0	4
March	0	1	4	12	4	0	3	0	3
April	4	14	5	46	30	1	5	3	15
May	10	30	4	83	61	11	81	45	15
June	13	64	26	68	58	70	100	100	13
July	46	113	96	47	99	76	100	66	9
August	76	168	140	18	120	113	109	83	6
September	64	105	65	20	55	47	123	44	14
October	32	58	16	13	5	6	19	4	7
November	17	26	2	17	2	1	4	0	4
December	11	9	0	0	0	0	0	0	0

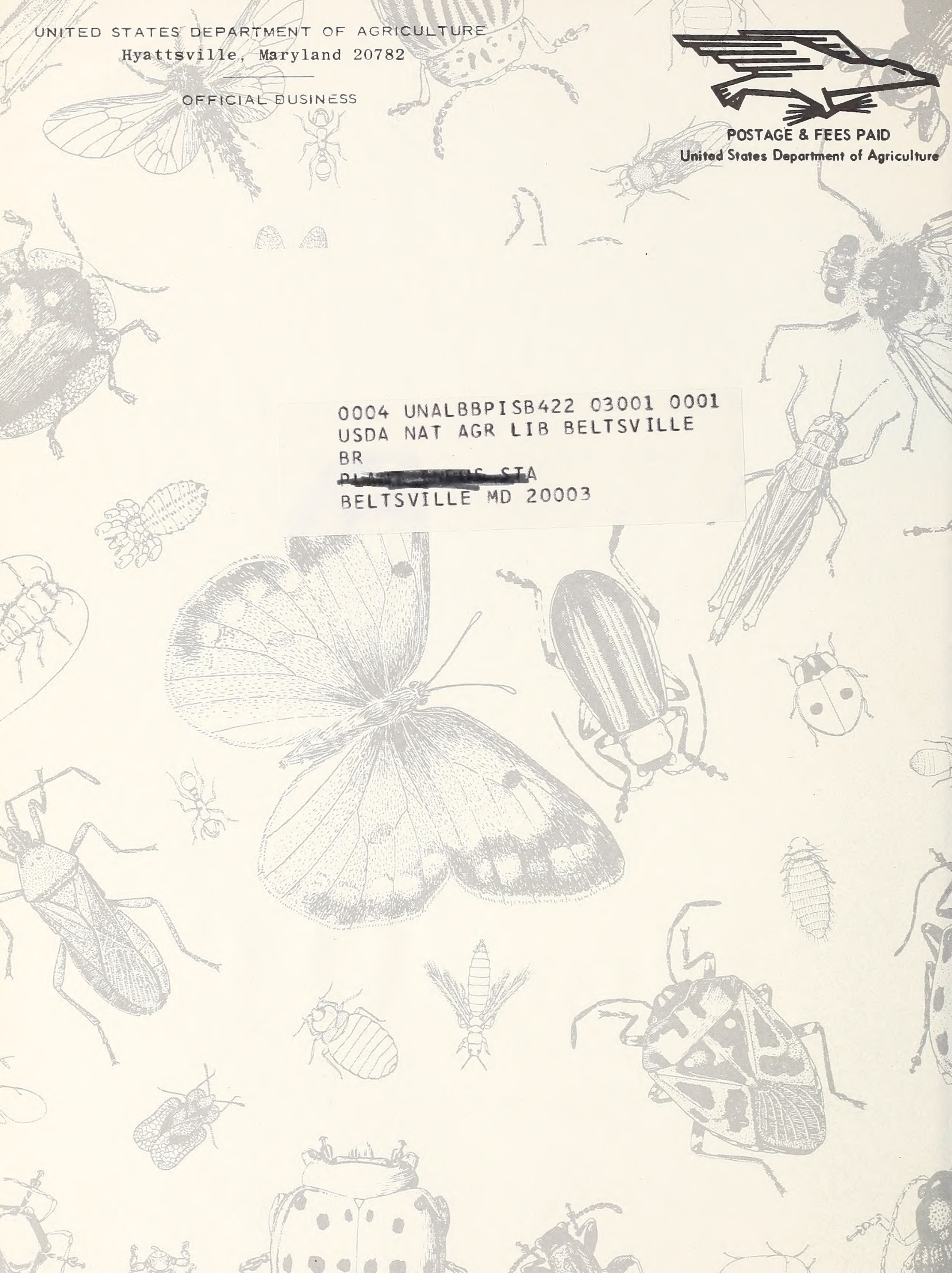
Activity of Corn Earworm



U.S. Dept. Agr.
Coop. Econ. Ins. Rpt.
21(7):71-76, 1971

Weather of the week continued from page 66.

TEMPERATURE: Temperatures during the week ranged widely. Miami, Florida, registered 84° Monday afternoon, Hayward, Wisconsin, -39° Tuesday morning. Cold weather prevailed over much of the Nation early in the week. Subzero temperatures were common in a score of Northern States from Montana to New England, and as far south as Kentucky where London recorded -10° Tuesday morning. Subfreezing temperatures occurred in all the continental States Tuesday morning, when Jackson, Mississippi, registered 32° and Jacksonville, Florida, 30°. Moist gulf air pushed northward over mid-America about midweek. Dodge City, Kansas, registered 63° Wednesday afternoon. On Thursday the mercury at West Plains climbed to 60°, 28° warmer than the previous day. Bitter cold continued over the northern Great Plains and eastward to New England, where afternoon temperatures remained below freezing through the entire week. Sunday was especially cold. Minimums dropped to zero or lower as far south as northern Kansas, and afternoon temperatures failed to go as high as zero at some localities in the northern portions of Nebraska and Iowa. The temperature at Waterloo, Iowa, reached -30° Sunday afternoon and plunged to -25° Monday morning, February 8. Temperatures averaged above normal in the Great Basin and much colder than normal over most areas east of the Continental Divide. (Summary supplied by Environmental Data Service, ESSA.)



UNITED STATES DEPARTMENT OF AGRICULTURE
Hyattsville, Maryland 20782

OFFICIAL BUSINESS

POSTAGE & FEES PAID
United States Department of Agriculture

0004 UNALBBPISB422 03001 0001
USDA NAT AGR LIB BELTSVILLE
BR
[redacted]
BELTSVILLE MD 20003